

WINTER INJECTION OF 2,4-D AND TORDON 101  
FOR HARDWOOD CONTROL<sup>1</sup>

Abstract.-During the winter of 1965-66, concentrates of Tordon 101 and 2,4-D amine were injected at 1-, 3-, and 5-inch intervals around the stems of southern red oak (*Quercus falcata* Michx.), sweetgum (*Liquidambar styraciflua* L.), hickory (*Carya* spp.), and flowering dogwood (*Cornus florida* L.). Tordon 101 produced higher mortality than 2,4-D amine in all species, although with hickory the difference may have occurred by chance. Tordon 101 killed over 90 percent of the red oaks and sweetgum at 5-inch spacing and more than 50 percent of the hickory and 40 percent of the dogwood at 3-inch spacing.

Loblolly pine (*Pinus taeda* L.) is the principal timber crop on most uplands in the lower Piedmont. On moist sites, however, low-value hardwoods encroach beneath the pine overstory. If pine is to be regenerated on these sites, hardwood control becomes necessary. Injection of herbicides into trees 3 inches d.b.h. and larger is a frequently used method for this purpose.

Results reported in an earlier Research Note<sup>2</sup> indicated that 2,4-D amine concentrate (alkanolamine salt of 2,4-D at 4 pounds acid equivalent per gallon) will control flowering dogwood (*Cornus florida* L.), hickory (*Carya* spp.), and southern red oak (*Quercus falcata* Michx.) when injected during the summer months. However, only red oak was effectively controlled with winter injections of 2,4-D. Because 2,4-D is a relatively poor herbicide when applied during the dormant season, a study was designed to test the effectiveness of winter injections of Tordon 101.<sup>3</sup> (Each gallon of Tordon 101 contains

0.54 pound acid equivalent of 4-amino-3, 5, 6-trichloropicolinic acid and 2 pounds acid equivalent of 2,4-D as the triisopropylamine salt.) The study included 2,4-D as a basis for comparison.

This report presents the mortality levels resulting from winter injections of these two herbicides into the above hardwood species, plus an additional species, sweetgum (*Liquidambar styraciflua* L.).

## METHODS

A factorial experiment with three replications was used to test the two herbicides at three injection spacings. A total of 360 trees (90 of each species) were selected. The trees, which ranged in d.b.h. from 2 to 15 inches, were injected during February 1966 at spacings of 1, 3, or 5 inches. One milliliter of herbicide concentrate per incision was inserted into the base of each tree with a calibrated tree injector. The treated trees were checked for mortality 6, 15, and 18 months after treatment. Only complete top kill with no sprouting is reported.

## RESULTS

Average percent kill by Tordon 101 was greater than that by 2,4-D for all species, tree sizes, and spacings (table 1). The largest difference in mortality levels between the two herbicides occurred in hickory and dogwood,

<sup>1</sup>This study was conducted in cooperation with the Georgia Forest Research Council.

<sup>2</sup>Moyer, Elbert L., Jr. Controlling off-site hardwoods with 2,4-D amine concentrate. Southeast. Forest Exp. Sta., U. S. Forest Serv. Res. Note SE-II, 2 pp. 1967.

<sup>3</sup>Mention of a trade name is for purposes of identification only and does not constitute endorsement by the U. S. Department of Agriculture.

Table 1. --Percent mortality of the four species 6, 15, and 18 months after winter injections of 2,4-D and Tordon 101 at spacings of 1, 3, and 5 inches

Species	Months after injection	Percent mortality after injections of -					
		2,4-D			Tordon 101		
		1 -inch spacing	3-inch spacing	5 -inch spacing	1-inch spacing	3-inch spacing	5-inch spacing
----- Percent -----							
Dogwood	6	7	0	0	47	13	13
	15	13	0	0	47	40	13
	18	13	0	0	53	40	13
Hickory	6	0	7	0	33	27	7
	15		13		53	47	20
	18	13	13	7	53	53	20
Sweetgum	6	27	13	0	100	87	87
	15	60	33	13	100	93	93
	18	67	40	13	100	93	93
Red oak	6	80	67	53	93	87	100
	15	87	80	73	100	100	100
	18	93	86	73	100	100	100

which are classified as hard-to-kill species. For all practical purposes, the 2,4-D winter injection failed to kill these two species. Tordon 101, although not highly effective, did kill about half the hickory and dogwood at spacings of 1 and 3 inches. The other two species, red oak and sweetgum, which are classed as easy-to-kill, were readily controlled by either herbicide, although Tordon was more effective than 2,4-D on sweetgum.

One inch, the closest spacing tested, generally gave the highest mortality for all species. However, Tordon 101 was also very effective at up to 5-inch spacings on red oak and sweetgum.

## CONCLUSIONS

The results of this study confirm the conclusion reported in the previous Research Note that 2,4-D is a suitable herbicide for red oaks when injected during the dormant season at 8-inch intervals or closer. As recorded in this study, sweetgum was moderately susceptible to kill with 2,4-D at 1-inch spacing. Tordon 101 was found to be a fast-acting, effective herbicide for controlling red oak and sweetgum during the dormant season, even at 5-inch spacing; but mortality for hickory and dogwood was only 50 and 40 percent when injected at 3-inch spacing.

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